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East Europe Report

SCIENTIFIC AFFAIRS

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CONTENTS

BRIEFS

CEMA MICROELECTRONICS PROGRESS--Implementation of the CEMA microelectronics program is progressing well. The agreement for multilateral cooperation in setting up a unified basis for manufacturing the technological equipment needed to make semiconductor and special substances will enable CEMA members to approach a Western state-of-the-art level in such technologies more quickly. Intensive implementation is proceeding in three areas: joint development and specialized production of technological equipment required for fabricating ICs; development and reciprocal shipment of ultra-pure chemicals and metals; determination of a unified selection of semiconductors and IC elements. In implementing its electronics program, the MEV [Microelectronics Enterprise] of Hungary can begin operating with a MOS production line from the USSR. This line will be rounded out with equipment from other CEMA countries. At the same time, Hungarian technological metering systems developed by MEV, EMG [Electronics Metering Instrument Factory] and MIKI [Instrument Industry Research Institute] are operating successfully in other CEMA countries. [Budapest MUSZAKI ELET in Hungarian 24 Nov 83 p 16]

CSO: 2502/19

INSTITUTE CONDUCTS BIOTECHNOLOGY, GENETICS RESEARCH

Leipzig LEIPZIGER VOLKSZEITUNG in German 15-16 Oct 83 p 10

[Interview with Dr Manfred Ringpfeil, director, Institute for Chemical Engineering, GDR Academy of Sciences, by Manfred Schulze: "Will Microbes Soon Furnish Our Raw Materials?"; date and place not specified]

> [Text] The promising future of biotechnology and its current state were discussed with Dr Manfred Ringpfeil, professor, academician, director of the Institute for Chemical Engineering of the GDR Academy of Sciences by the LEIPZIGER VOLKSZEITUNG.

Question: During the last few years, biotechnology has developed at a rapid rate and today it is often called the science of the future. How do you, as director of an institute working in this field, judge the status of biotechnology?

Prof Ringpfeil: Today there are a series of publications which are to be taken seriously and which start with the premise that, among the main lines of development of the productive forces, biotechnology is at the forefront. The OECD (Organization for Economic Cooperation and Development), for instance, in a forecast on microelectronics, names the use of oceanic resources, the creation of new forms of energy and biotechnology as the principal goals of future development. The French government placed the importance of biotechnology at the same level with microelectronics. This classification--equally valid for the socialist states--is increasingly confirmed through practice.

Question: How is this manifested?

Prof Ringpfeil: First of all in the rapid increase of knowledge in the natural science of biology especially in the fields of molecular biology, microbiology and biochemistry. There are great forces here which will have a revolutionary effect on technology. But biotechnological processes also have found entry into a series of industrial branches already, above all into the chemical and pharmaceutical industry, into water management, the food industry and metallurgy. The USSR, for instance, where a central administration for the microbiological

industry was created already in 1965, has produced more than one million tons of fodder yeast since 1980. These are already national economically significant orders. In Japan, several percent of the national income is already derived from the bioindustry.

Question: Has the GDR also reached an internationally significant level in biotechnological research?

Prof Ringpfeil: The Academy of Sciences of the GDR has begun early with research in the field of biotechnology. Already by the end of the 1960's, significant research capacities were created--not the least of which are in Leipzig. In addition, it is also advantageous that we belong among the few countries which have a productive chemical industrial park. Furthermore, our country is interested in the development of plants and equipment for biotechnology. In addition, the close cooperation with the USSR and research institutions in other socialist countries also has to be pointed out.

We started out with the decision that the GDR must participate not only in the development of biotechnology but also in its definition. The interest of our domestic and foreign industry partners in our results, the acknowledgement of the results of our basic research at international congresses and our position in international scientific centers indicate that so far we have succeeded with this intention.

Question: We all see innumerable instances of the application and effects of microelectronics. With biotechnology it appears to be different so far. When will the very promising findings be transferred to a wider base in practice?

Prof Ringpfeil: This transfer has already begun in certain areas. Just let us think of the production of medicines by microorganisms. Nevertheless--and this is true world-wide--only a small fraction of what our science has already made possible in theory and in the laboratory has been technically applied. But precisely for this reason is the goal-oriented development of biotechnology necessary, because new production forms will be created here whose economic application require extensive new knowledge.

Question: Since biotechnological procedures are suited above all for the production of raw materials, one can derive its consequences on the world-wide problem of scarcity of resources. Will biotechnology also have an effect on our raw material situation?

Prof Ringpfeil: Definitely. Indeed, one of our main goals is to increase the availability of raw materials to the material processing industry. This will be accomplished in several areas. For instance, we are searching for ways to better utilize the fossil raw materials, to make accessible regenerable materials such as cellulose and to reuse secondary raw materials with the help of microorganisms, enzymes and other biological or biogenic systems. Thereby frequently several positive effects are yielded simultaneously. When we make waste water usable in this manner, environmental protection is associated with the production of a valuable material.

But the list of the uses of biotechnology to produce raw materials can be continued. The properties of microorganisms can also be used for inorganic materials such as the reclamation of heavy metals from diluted solutions or the processing of very poor ores.

A whole new complex is the improvement of agricultural production, indeed even its supplementation is possible. When protein can be produced by microbiological means today, this is a first step toward producing basic materials for nutrition by non-agricultural methods. Thus, independently from soil quality, weather, climate and season, one produces fodder under large-scale industrial conditions for our animal stocks.

We expect much from the further introduction of gene technological methods into the bioindustry. The manipulation of microorganisms opens nearly inexhaustible possibilities for production. And these are by no means exclusively for the distant future. Already within a few years, the first of these projects will be realized and our efforts are also aimed at being in the forefront there.

2473
CSO: 2302/5

COUNSELING IN GENETICS, BIRTH DEFECT PREVENTION

East Berlin DAS DEUTSCHE GESUNDHEITSWESEN in German No 41, 1983 pp 1589-1591

[Article by Dr. H. Bach, director, GDR Human Genetics Counseling Center, Institute of Anthropology and Human Genetics, Department of Medicine, Friedrich Schiller University, Jena: "On the Development and Current Status of Human Genetic Counseling Service in the GDR"]

[Summary] In most recent times, human genetics has become an important component of prophylactic medicine. In the article, the building of a human genetic counseling service in the GDR is reported. Physicians are offered the possibility to get in contact with human genetic counseling stations.

[Text] It should not be overlooked that, during the postwar period--compared with the development in comparable countries--human genetics had particularly great initial difficulties in the GDR. The primary reasons for it are that the discipline had been misused by the national socialistic ideology concerning races, especially in the so-called "race hygienic measures" and thereby it contributed to bringing immeasurable suffering to humanity. But it was not only the resulting understandable distrust which hindered the development of human genetics. To it were added the consequences of the unscientific Lysenko era and later the no less problematic discussions iwth reversed sign about the biological future of man a not too laudable landmark of which was the corresponding CIBA Symposium in 1963, in London. Only during the second half of the 1960's did human genetics succeed in largely demolishing the justified reservations against it. Above all, the newly established Human Genetics Research Community of the genetics section of the German Academy of Sciences in Berlin made a considerable contribution to this.

The planned development of human genetics began in the GDR in 1971 with the establishment of the research project on "human genetics" by the ministry of health. This research project largely determined the establishment of the specialty in the 1970's not only because it gave itself the task to do pure research but also because it played a large role in the creation of the institutional and material-technical basis including the training and advanced training of collaborators in the field of human genetics. The number one priority of the research project was

to build an effective human-genetics/scientific-technical approach especially with respect to making available a broad spectrum of methods for the diagnosis of chromosomal anomalies, inherited metabolic defects, and prenatally diagnosed diseases and malformations of genetic origin. This included the development or adaptation and introduction of mass screening methods for phenylketonuria and mucoviscidoses, and also for genetic defects in high risk groups such as, for instance, Wilson's disease. A testing system for mutagens was established simultaneously to pinpoint and remove mutagenic environmental factors.

With the establishment of the Human Genetics Society in the GDR in 1978, a part of the tasks which were to be solved in connection with human genetic counseling were turned over to the Society with its work groups involved in "human genetic counseling," "cytogenetics," "biochemical genetics" and "neuromuscular diseases." In 1980, as part of a general definition of research, the "human genetics" research project was succeeded by "genetic defects," a line of research activity belonging to the principal research area of "pregnancy and early childhood development." This line of research can fully concentrate on the realization of research objectives because of the newly created associations and the recent institutionalization of human genetics at all universities and medical academies, as well as in a series of human genetic counseling stations and special establishments within the framework of the university and state health services.

Apart from a more or less sporadic human genetic counseling activity at various establishments, during the years between 1971 and 1975, two model counseling stations were developed in a planned manner, first in the Medical Genetics Section of the Pediatric Clinic of the Medical Academy in Magdeburg--that is, in the framework of a clinical institution--and at the Institute of Anthropology and Human Genetics at the Medical Faculty of Friedrich Schiller University in Jena--that is, in a theoretical institution but, in this case, in cooperation with the State Health Services of the Gera District. The consciously varied selection of conditions was also expressed by the fact that the counseling services in Magdeburg are being--and will be--directed by a physician and the ones in Jena by a biologist. Based on the experiences gained in Magdeburg and Jena, and the analysis of the international preception and state of development, in 1975, the Human Genetics research project was submitted to a thorough study which was widely discussed, was endorsed by the minister of health, and became the obligatory foundation for the further development of human genetic counseling in the GDR.

Thereby we reached the conclusion that, in our circumstances which, among others, are characterized by a dense network of medical institutions and relatively short travel distances, a large number of small, independent counseling centers--somewhat like the model of our marriage and sex counseling centers--would be ineffective. Therefore, from the beginning, we were striving to establish fewer counseling centers but well equipped with personnel and materials which are integrated in a district or university institution whenever possible. Thereby already existing lab

facilities and also the available technical personnel could be used and, in the interest of a high scientific level of counseling, the necessary experiences can be obtained through a greater number of consultations, and the required interdisciplinary cooperation can also be guaranteed. Therefore, the territorial organization of human genetic counsling took place at the district level. That means that, as a rule, a counseling center is going to be built in every district which must serve about 1 million citizens on the average. In the meantime, this program has been accomplished with few exceptions. Thereby the counseling centers, either directly or in cooperation with other establishments, have suitable laboratory facilities for genetic diagnosis. For the best possible utilization of experiences and equipment, efforts will be made here--and also in counseling--toward a measure of specialization in certain relevant methods or certain diseases. Thus, for instance, cytogenetics is particularly well developed in Berlin, Dresden, Halle, Jena, Leipzig, Magdeburg, Neubrandenburg and Rostock; prenatal diagnostics in Berlin, Jena, Leipzig, Magdeburg, Neubrandenburg and Rostock; biochemical genetics in Griefswald and Leipzig; aerogenetics in Berlin and Leipzig; the diagnostics and genetics of neuromuscular diseases in Dresden, Erfurt, Halle, Jena, Leipzig, Magdeburg and Neubrandenburg; opthalmogenetics in Halle; the genetics of diseases of the ear, nose and throat in Dresden; the genetics of heterozygous carriers in Halle, Jena and Leipzig; the diagonstics and genetics of Wilson's disease in Leipzig. Whereby only a few important specialization trends and by far not all were mentioned here, and it must be mentioned that there still remain problems in some areas. Thus,--as is evidently also the case in other countries--our cytogenetic capacity, especially for prenatal diagnostics, is not yet sufficient for optimal care. But concentrated efforts are currently in progress to set the counseling in motion above all in Karl-Marx-City but also in Suhl and Potsdam, and to make prenatal diagnostics possible also in Dresden, Karl-Marx-City and Erfurt.

An effort was made from the beginning to avoid the establishment of counseling centers working in isolation and to insure a finely tuned development in the sense of a counseling service covering the area and corresponding to the demands which permits a maximal use of all possibilities in the interest of those seeking advice.

Since the responsible state authorities see human genetic counsling as the most important task of human genetics, the centralized human genetic research is also largely oriented toward the needs of human genetic counseling in order to insure the required scientific-technical conditions. The weight of the work of the Human Genetics Society is in the same direction. Therefore, the Society and the "genetic defects" research line are the most important cooperative partners of the human genetic counseling service. Numerous partners are added from the state health and university systems, the Academy of Sciences and, in isolated cases, also from industry.

Of course, the diversity of these necessary relationships requires a certain coordination. Therefore, the Institute of Anthropology and Human Genetics in the Field of Medicine, at Friedrich Schiller University in Jena was entrusted with looking after the tasks of a Human Genetic Counseling Center in the GDR. In addition, this establishment must insure, among others, the advanced training and the regular exchange of experiences of specialists working in human genetic counseling, provide for a uniform documentation of findings and literature, accept the task of central oversight, provide rapid literature access and establish a central case file with the primary goal to make available the experiences of other counseling centers with eventual parallel cases in difficult counseling situations.

From the very beginning, in the organization of human genetic counseling, the greatest value was placed on a close cooperation and discussion with clinicians and natural scientists of various specialties, but also with philosophers, sociologists and laywers in order to work out responsible general counseling principles. Without being able to discuss further details here, let it merely be stressed that we see it as a decisive, constant task to prevent any misuse of human genetic knowledge and possibilities, and in this connection we would consider any interference with the freedom for individual decision as violating human dignity. But since every well understood, free decision depends on a correspondingly founded insight into the real circumstances which, in the case of human genetic counseling, usually touches not only the particular individual but also society and frequently also an unborn life, we see in the thorough enlightening of the persons affected a not to be dismissed basis for helping with the decisions which is offered in the framework of human genetic counseling.

Today it can be stated not without satisfaction that, in the GDR during the last decade, a series of human genetic counseling centers were not only established but that we have a planned and well attuned system of counseling possibilities and the necessary related establishments which are capable of solving the currently existing requirements very well and adequately in terms of the international state of knowledge, in pleasing professional cooperation. Thereby one can start with the premise that it will be gradually further expanded, corresponding to the anticipated increase in requirements. But it should not be overlooked that, today, only a fraction of the individuals who should have to be counseled do indeed take advantage of human genetic counseling. The main reason is a lack of knowledge about the necessity and availability of counseling on the part of the afflicted and also among many physicians. Today more than 3,000 signs--overwhelmingly diseases and malformations--are known to be genetically caused in full or in part. In most of these cases it is possible to establish a prognosis for inheritance just as, increasingly, there are procedures available so that, in certain cases, even people with a genetic burden with a high level of accuracy can be guaranteed the birth of a child free of the particular inherited disease. Therefore, it is the self-evident duty of every physician to see to it that all high risk individuals are put in the position to take advantage of all the

possibilities offered by modern human genetics. Since, with the extraordinarily rapid growth of knowledge in human genetics, it cannot be expected that every physician himself could give expert counseling in every case, he should seek with full confidenee the cooperation with a human genetic counseling center in every doubtful situation. In order to facilitate the initiation of such cooperation, the addresses of the genetic counseling centers working within the Human Genetic Counseling Service of the GDR will be published in the following. Inquiries about additional establishments which conduct special counseling or examinations can be directed to these counseling centers and to the Human Genetic Counseling Center of the GDR.

Institute of Anthropology and Human Genetics in the Medical Faculty at Friedrich Schiller University in Jena, Human Genetic Counseling Center of the GDR, 6900 Jena, Kollegien Street 10--Telephone: 8 22 42 66;

Medical Genetics Department of the Neurological Clinic, Faculty of Medicine (Charite) of Humboldt University, 1040 Berlin, Schumann Street 20/21--Telephone: 2 86 23 36;

Genetics Section of the Gynecological Clinic, Faculty of Medicine (Charite) of Humboldt University, 1040 Berlin, Tucholsky Street--Telephone: 28 46 65 33/28 46 62 27/28 46 61 32;

District Center of Human Genetic Counseling, Berlin, II. Pediatric Clinic of the City Hospital, 1115 Berlin-Buch, Wiltberg Street 50--Telephone: 5 69 78 21 (ext. 8221);

Human Genetic Counseling of the Pediatric Clinic of the District Hospital, 7500 Cottbus, Thiem Street 111--Telephone: 66 29 88;

Department of Clinical Genetics of the Medical Academy "Carl Gustav Carus", 8019 Dresden, Fetscher Street 74--Telephone: 68 28 91;

Department of Medical Genetics of the Medical Academy, 5080 Erfurt, Klement-Gottwald Street 34--Telephone: 38 72 38;

Human Genetics Section of the Pediatric Clinic of the District Hospital, 1200 Frankfurt (Oder), Heinrich-Hildebrandt Street 21--Telephone: 4 22 81/ext. 44 and 48;

Institute of Medical Genetics, Faculty of Medicine, Ernst-Moritz-Arndt University, 2200 Greifswald, Fleischmann Street 42-44--Telephone: 25 95;

Human Genetics Counseling Center of the District, 4020 Halle, Karl-Liebknecht Street 11--Telephone: 2 33 33;

Institute of Biology, Faculty of Medicine of Martin-Luther University, 4020 Halle, Universitats Square 7--Telephone: 83 24 14 - 16;

Human Genetics Section of the Pediatric Clinic, Faculty of Medicine, Karl-Marx University, 7039 Leipzig, Karl-Marx-Stadter Street 50--Telephone: 8 18 34, 8 57 45;

Human Genetics Sectionof the Pediatric Clinic of the Medical Academy, 3010 Magdeburg, Leipziger Street 44--Telephone: 4 42 17;

Human Genetics Section and Genetic Family Counseling of the District Hospital, 2000 Neubrandenburg, Sonnenkamp 1--Telephone: 62 37;

Neonatology and Clinical Genetics Division of the Pediatric Clinic, Faculty of Medicine of Wilhelm-Pieck University, 2500 Rostock 1, Rembrandt Street 16-17--Telephone: 39 67 33.

2473
CSO: 2302/6

INSTITUTE USES X-RAY SCATTERING TO STUDY PROTEIN MOLECULES

Interview with Scientist

East Berlin TRIBUENE in German 6 Oct 83 p 11

[Interview with Dr. Gregor Damaschun, Chief, Department of X-Ray Small-Angle Scattering, Central Institute for Molecular Biology, GDR Academy of Sciences, by Thomas Conrad; date and place not specified]

[Text] X-ray small-angle scattering research conducted at the central institute for molecular biology of the GDR Academy of Sciences over the past several years has succeeded in obtaining important insights into the building plans of biological macro-molecules. The research work has been aimed at gathering more information about basic life phenomena such as protein synthesis, the effect of enzymes, cell metabolism and the body's defense against sickness with the help of immune reactions. We found out some interesting particulars in a conversation we had with Professor Dr Gregor Damaschun, the head of the X-ray small-angle scattering department.

[Question] What exactly is meant by X-ray small-angle scattering ?

[Answer] It is a physical method with the help of which we are able to discover the structure of biological macro-molecules such as proteins and nucleic acids contained in bacteria as well as in plant and animal cells and the cells of human beings. Before we can start our research work, specialists must remove and clean those molecules from the cells which we are investigating. That is why we work closely together with biochemists from our own central institute for molecular biology and with teams from the central institutes for nutrition, genetics and cultivated plants of the academy. For this particular research procedure, we need a few milligrams of the purified molecule in question.

[Question] Why do the molecules have to be purified first ?

[Answer] There are thousands of different molecules contained in each cell. They work together to help the cell function properly. Now if we happen to be interested in a particular molecule such as DNA where the hereditary functions are stored, then this specific nucleic acid must first be isolated out of the living cell organism with the help of a biochemical procedure. To conduct our structural investigations, we need a great many molecules of the same type. It takes 30 or 40 rat livers to obtain just five milligrams of a nucleic acid sample, for instance. And that is a pretty cumbersome process.

[Question] But how do you determine the molecular structure ?

[Answer] The purified molecules which are kept in a solution are bombarded with X-rays. The individual atoms of these molecules scatter the X-rays. The intensity of the rays scattered through the sample is measured by a so-called diffractometer depending on the scattering angle. The measurements thus obtained help us determine the cause of the scattering effect and the position of the individual atoms in space. This job is done for us by a computer connected to the diffractometer. The image which can be seen in the case of a microscope is prepared for us in this procedure by the computer. That is necessary because there are no lenses for X-rays to enable one to come up with a visual image of the scattered rays through computation. To prepare such an image, we have to have several hours on one of the most advanced computers we presently have in the GDR.

[Question] How long does it take from the time the sample is first examined to the time a given molecular structure has been determined ?

[Answer] A structural analysis of this kind takes from 6 months to a year. For this reason, one must consider very carefully which particular molecules one wants to study. We are trying to reduce this time with the help of more automatization; but even the best computer will not come up with a given structure in a fully automatic fashion. The scientific researcher will always have to design the most advantageous program for his specific undertaking.

[Question] What is the purpose of this rather substantial scientific effort ?

[Answer] To a large extent, the work we do is basic research work. Quick, short-term results are therefore the exception rather than the rule. Worldwide, the structures of only about 200 protein molecules and nucleic acids are known at this time. Thus, we are at the very start of some major developments in this field. Since we are the only team in the GDR familiar with X-ray small-angle scattering of biological macromolecules, we are looking into a great many molecules for a variety of purposes.

[Question] Could you give us an example ?

[Answer] For one thing, we are studying the structure of nucleic acids in order to find out how the programming processes inside the cell function. We examine exactly how a specific cell goes about synthesizing a particular protein. No cell is capable of producing the proteins it needs simultaneously; they are produced sequentially according to a control system. Some substances such as antibodies which fight intruding pathogenic agents are only produced in response to specific biochemical calls issued by the organism. We study how these processes are controlled. In this manner, we hope to understand some time in the future why the control mechanisms no longer function in some cases—as for instance in the case of some illnesses. This research work is an indispensable scientific first step along the way of mastering problems such as the carefully directed control of hereditary processes in the future.

[Question] Are all the research projects conducted by your department of such a long-term nature ?

[Answer] No. We are also looking into the structure of so-called maltodextrin gels in collaboration with the central nutrition institute. These are starch-produced substances widely used by the food industry—for instance in the production of low-fat mayonnaise. The problem was to find a non-fat substance that mixes well with fats and that has a consistency like mayonnaise. Based on our structural analyses, we now know exactly what the characteristics of such a substance should be. Our goal is to improve the laboratory-developed techniques for the production of these maltodextrin gels by applying our findings with regard to the submicroscopic processes in real-life situations.

[Question] Is the atomic structure of all molecules of a given kind the same or are there deviations ?

[Answer] If we are dealing with the same type of molecule—such as a specific protein—then we know that all the molecules are similar. The functions of such cell building blocks often are restricted to just one. That is why their structure is severely limited in terms of functionality.

[Question] What exactly is the advantage of using the X-ray small-angle scattering method as opposed to using microscopes ?

[Answer] With a conventional microscope, one cannot study structures smaller than the length of light waves (or about 400 nanometers). We, however, are concerned with the position of individual atoms and groups of atoms. In other words, the context we are talking about is somewhere between 0.1 and 10 nanometers. Forms of this kind can also be made out with the help of an electron microscope. But the great disadvantage is

that the molecules must be transferred from their natural environment to a vacuum in order to be studied. Under those circumstances, the samples are only available in very thin, dried layers. But when they come to us in this shape, their structures may have been greatlt altered. Small-angle scattering, on the other hand, permits us to study the molecule in its natural, biologically active state.

[Question] Are you also working on new principles of genetic engineering ?

[Answer] We are concerned with the manner in which nucleic acids are packaged inside the cell. Such molecules, which are a few centimeters long, are "folded together" by nature so that they can be housed inside the cell—in other words, inside a space that measures about 10 micrometers in diameter. The cell must therefore possess some kind of a mechanism which stows the nucleic acid in somewhat like a thread that is wound on a spool. Exactly how this is done we still do not know. But if we found out, this could play an important role in manipulating the genetic structure of bacteria for biological production.

[Question] Is there a way of artificially altering protein structures in an exact manner ?

[Answer] Yes. We are hoping, for example, to adapt plant proteins to animal proteins in the future. For now, plant proteins are fed to animals and we then consume these animal proteins. But in the course of this process some 40 to 50 percent of the proteins are lost. The goal now is to produce a number of plant proteins in such a way that they can be added directly to certain animal products such as sausage. But to perform manipulations of this sort, we must first know exactly what the structural differences between the two proteins are.

[Question] Would that constitute a first step toward the production of artificial meat ?

[Answer] We are working on this problem jointly with the central institute for nutrition. Structural analysis of plant proteins such as rape seed should prepare the way for it. The transformed proteins would then have to be spun into threads which would then have to be "woven" into a meat-like substance. The important thing would be to succeed in obtaining the consistency of meat. In this case, too, we would have to know exactly what the structural differences between the plant and the animal proteins are.

[Question] What types of cooperation are there with our CEMA partners ?

[Answer] Our central institute is cooperating very closely with institutions in the USSR, in the CSSR and in Hungary within the framework of the CEMA agreement on biophysics. We operate as the CEMA countries' special laboratory for the study of biological macromolecules with the aid of X-ray small-angle scattering. We are in the process of developing the technology further and visiting scientists from other countries have an opportunity to work here as well. In addition, we are coordinating the development of computer programs for the evaluation of X-ray small-angle data.

Dr. Hilde Damaschun of the Central Institute for Molecular Biology and Dr. Leonid Moghilevsky, her Soviet colleague from the Institute for Crystallography of the USSR Academy of Sciences, are shown in front of a portable RNA model consisting of 1,630 atoms.

Biographic Data

East Berlin TRIBUENE in German 6 Oct 83 p 11

[Photo Caption] Gregor Damaschun was born in Berlin on 5 February 1938. From 1955 to 1960, he studied at Friedrich Schiller University in Jena. From 1960 to 1970 he served as scientific assistant, then as senior assistant and finally as deputy head of the university's physics department. In 1965, he completed his dissertation at Jena. His specialty was X-ray microstructure analysis. Collaborating with medical institutes, Dr Damaschun became more and more interested in the structural analysis of biological molecules. His work in this field led to his being nominated to the Academy of Sciences in 1970. At the academy, he was later named head of the X-ray small-angle scattering department at the Central Institute for Molecular Biology. In 1981, the title of professor was conferred upon him. For 4 years, Prof Damaschun was chairman of the central working group for biophysics of the GDR research council.

9478
CSO: 2302/10

DATA BANK FOR PROTEIN, NUCLEIC ACID MOLECULES

East Berlin TRIBUENE in German 6 Oct 83 p 11

[Article signed "Mae/Co": "Data Bank for Proteins Stores Descriptions of Molecules"]

[Text] In this day and age, a great deal of information can be stored in a readily accessible manner in computer-based data banks on magnetic tape. A facility of this type—a so-called protein data bank—is at the disposal of GDR scientists working on basic research in medical biology. At the computer center of the Central Institute for Molecular Biology of the GDR Academy of Sciences in Berlin-Buch a great deal of information on proteins and nucleic acids is stored. The latter are the primary building blocks of all living matter. They are giant molecules, each of which consists of many thousands of atoms. The nucleic acid molecules are the carriers of hereditary infromation and the protein molecules perform important functions connected with cell metabolism.

In the space of just a few minutes, it is now possible to locate the desired data. The heart of the data bank is an advanced Soviet BESM 6 computer. The data on any substance in the computer's memory can be obtained both as a complete printout and can be augmented with the aid of special programs which are part of the data bank itself.

Complete Listing of Atomic Coordinates

The complete printout contains the following information on every molecule: the name of the molecule; the biological source of the material; the secondary structural characteristics in the case of proteins; crystallographic information in the case of crystals and a complete listing of all coordinates of the molecule's atoms insofar as these have been determined. The number of recorded structures is continuously added to.

Those benefitting from the information available at the Buch data bank are biochemists and biophysicists of the academy institutes, the colleges and universities as well as the research departments of industrial enterprises. In addition, their colleagues in the CEMA countries also benefit from this facility. Important medical research information on hormones, blood proteins, digestive enzymes and antibodies are also stored in the data bank.

Researchers Unravel Complex Structures

A hemoglobin molecule, for example, consist of 5,494 atoms. Hemoglobin, the coloring matter of the red blood corpuscles, ca[illegible] oxygen from the lungs to the muscles and other organs. Inside the data bank, the location of every single atom of this molecule is stored.

It takes a team of scientific researchers up to 3 years to unravel a complex structure of this kind. Scientists from Berlin's Humboldt University, working on a joint research project with members of the Crystallographic Institute of the USSR Academy of Sciences, succeeded in deciphering the structure of pyrophosphatase—which is the enzyme that plays a key role in the fat metabolism of human beings.

The molecules stored in the data bank may also be displayed visually with the aid of a computer-controlled plotter. This device makes it possible to obtain images from whatever angle of molecular structures consisting of up to 900 atoms. With the aid of additional computer programs, the distances between selected atoms may be determined and all the information can be collected that is required for the construction of three-dimensional wire models of the molecules concerned.

On the Way Toward Tailor-Made Substances

The goal of this basic research is to discover general laws regarding the structure of biological macromolecules and to obtain definitive information on the molecular relationships between different organisms.

In addition, the data bank can be used successfully to help develop new types of drugs, since there are many substances which tend to establish direct contact to certain receptors such as individual proteins and nucleic acids. If their structures are contained in the information stored in the data bank, the specific substances may be modified to conform with these structures.

9478
CSO: 2302/10

NEW GLASS DEVELOPED FOR INDUSTRIAL USE

East Berlin PRESSE-INFORMATIONEN in German No 132, 11 Nov 83 p 3-4

[Article by Dr. Fritz Schmoeker, General Director, VEB Industrial Glass Combine: "New Materials Made of Glass with many Advantages"]

[Text] We come into contact with glass in our daily lives in the most varied fields. We do not always fully realize that this is glass in its most manifold modifications. It is thus possible with the help of advanced scientific discoveries to use glass in many different ways through the choice of suitable raw materials and corresponding melting and processing technologies.

Development work for this raw material was determined in recent years in the GDR's industrial glass sector particularly by the tremendous development in electrical engineering and electronics. At the same time the important thing was to replace high-grade raw materials or working materials. New glass working materials were developed and they help decide the scientific-technological progress of products, for example, electrical engineering, already today.

Domestic Resources--Point of Departure

The workers of the Ilmenau Industrial Glass VEB developed the working material Ilmavit(R) 40 which is protected under patent law. This product is the result of goal-oriented research and development, derived from central guidelines on the increased use of silicate-containing working materials on a domestic raw material base as well as the increase in the employment of secondary raw materials. This new working material of the glass industry is being produced exclusively with domestic raw materials. It is furthermore interesting to note that industrial and mining waste products are being used in this product to a great extent. The advantages of Ilmavit(R) 40 are quite obvious: Use of secondary instead of industrially pure raw materials as well as application of a new process principle with which one can save about 20 percent energy compared to the conventional glass ceramics technology. At the same time it is possible in this new glass working material to combine original [master patern] shaping by means of casting methods and cutting by means of drilling, milling, and turning.

In the form available today, this working material represents an enrichment and expansion of the available assortment. It has a series of properties which offer advantages, as compared to conventional working materials, above all in

complex applications. That includes very good chemical resistance, low density, high charge temperature, and good electrical insulation. Besides, Ilmavit(R) 40 can be well processed.

In addition to the master-pattern shaping possibilities, which are new when compared to the other silicate-containing working materials, and the material-engineering properties, the product offers the possibility of further cutting on commercially available metal-working machines. As a result of this it is possible to make work pieces of complicated geometry with high degree of accuracy, such as it has so far been impossible to make them from silicate-containing working materials. Presently, Ilmavit(R) 40 is being employed especially in the chemical industry for acid-resistant nozzles, valves, and protective casings, in the consumer goods industry for heat-resistant handles and operating elements, as well as in electrical engineering for insulators for low voltages and direct current. Structural components made of this glass working material have also proved themselves stable in terms of shape and corrosion-proof in precision instrument engineering. Applied research conducted so far shows that manifold utilization possibilities exist in almost all industry branches.

Microelectronics--Main User

In addition to Ilmavit(R) 40, the newer glass working materials also include so-called passivization glasses. Here, glass types, specially developed for the particular use, are melted upon the surface of semiconductor structural elements. These glass types guarantee all requirements that can be made for a protective layer in layer thickness from 2 micrometers all the way to 2 millimeters. This is why glass passivization is used as technology for a large number of semiconductor structural elements today in order to increase the yield and the quality during production and practical application. Passivization glass types are an indispensable requirement for the production of certain structural elements. They are supplied in the form of glass powder types which are distinguished by a high degree of chemical purity. Such glass types were developed for the passivization of various structural elements at the Ilmenau Industrial Glass Works VEB. The production of such glass types for diodes, for example, was started in September of this year.

Various types of glass powder are even now being used as components of special pastes in making integrated circuits. In addition to adhesion to the carrier material, they also provide protection against environmental factors as well as the separation of multilayer circuits. The glass industry supplies an important component for the pastes to the electrical engineering and electronics sector in the form of this glass powder.

Glass working materials which are relatively new in the GDR also include IR-absorbing glass tubes. After a development period of 17 months on the basis of a new method, the Ilmenau Industrial Glass Works VEB began to produce the desired assortment last year. This involves above all tubes with a diameter of 2.5-5.2 millimeters which are needed to make protective tube contacts, such as, for example, in vehicle building, in the electronics industry, or in data processing systems.

These examples clearly show that glass simply cannot be excluded from the assortment of present-day and future working materials. But we can also clearly see that the required dimensions are becoming ever smaller especially in electrical engineering while the demands being placed on glass become ever bigger.

5058
CSO: 2302/12

APPLICATIONS OF BIOTECHNOLOGY IN COUNTRY NOTED

Budapest MUSZAKI ELET in Hungarian 29 Sep 83 p 5

[Article by Julia Berkes: "Potatoes Reproduced by Biotechnology"]

> [Text] Several thousand years ago wine, beer and bread were produced in Egypt with biotechnology In ancient Japan proteins were produced with the aid of microbes. These are facts, although biotechnology as a science is still of relatively recent origin. For example, the Hungarian biologists enumerate within the sphere of biotechnology all work which aims at producing, modifying or dismantling more recently natural materials by means of plant or animal cell culture and isolated enzymes, that is, with exclusively natural materials.

At the present time in Hungary biotechnological researchers are working in some 40 research institutes, drug plants and food factories. Almost 800 experts are investigating--still generally in laboratory surroundings--how antibiotic products can be expanded with microbes, how micro-organisms can be used in the application of waste materials, or how proteins can be produced with microbiological methods.

One of the research subjects is what natural protein materials could be produced with the enzymes from the large amount of animal blood decaying at any time in slaughterhouses. No matter how incredible it seems, there are some micro-organisms which can be used with great success in mining for minerals. These bacilli sort of "precipitate" the metals from the ore. They also win energy necessary for our lives in an equally unusual way by oxidizing inorganic minerals. For example. in the United States one-tenth of their refined copper is produced with the aid of micro-organisms. And since copper ore is also mined in Hungary, the specialists are not overlooking research on this subject either. Another biotechnology is the environmental protective process during which biological researchers sow certain protozoans to protect against water-polluting bacteria. A single micro-organism is capable of eating 7,500 harmful bacteria reproducing in polluted water.

Although biotechnology can be used in an extremely broad field with just as many useful purposes, there are still many people who identify biotechnology

solely with genetic engineering. However, another very new area is the special cell reproduction of farm plants, where in recent years there has been outstanding success in the practical application of biotechnology.

About 3 years ago at the initiative of the Szeged Biological Center of the Hungarian Academy of Sciences and a Budapest Agricultural Cooperative, four farms were coordinated to produce the Meriklon Measuring, Research, Development and Productive Farm Association. This included the establishment of a tissue-culturing laboratory, a diagnostic laboratory and special greenhouses for tropical plants. The purpose was to produce on a scientific basis and with biotechnology healthy reproducing materials free of viruses, that is, seeds and seedlings. Today this association is supplying the country's largest decorative flower, orchid, and even carnation producers are getting genetically important seedlings completely free of viruses.

Korolovszky András rajza

Caption: Drawing by Andras Korolovsky

However, the most fantastic phenomenon is seen in the provision for healthy potato reproducers. Hungary annually imports 10,000 to 12,000 tons of seed potatoes from the Netherlands. In the tissue-culture laboratory of the Meriklon Farm Association they can grow enough potato cells guaranteed to be free of viruses from uniquely healthy potato seeds to satisfy the entire seed potato needs of the country. The manager, Miklos Szegedi, has stated that one-sixth of the necessary amount can already be insured from cell reproduction, and that the only barrier to production implementation is that there are not enough greenhouses, and not enough places and men to raise the actual potato seeds from cell cultures. However, this is only a question of time since Meriklon--as he also assured us--is a profitable enterprise, and since many potato growers have already indicated their demands for the potatoes reproduced by biotechnological methods, and not in our country alone.

6806
CSO: 2502/7

COMPUTER NETWORK FOR MANAGEMENT OF POWER SYSTEM

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 4, 1983, pp 183-188

[Article by Peter Braun: "The ENERGONET Conception"; copy received 6 Aug 82]

[Text] The energetics computer network, ENERGONET, is a distributed intelligence, cooperative system based on a division of labor among the elements of the network. There are three levels of realization--large computers, node computers and network, or terminals. The article describes the concept of the network.

Introduction

Practical and permanent user areas for computer technology have now more or less developed in our homeland also. Use of this technology has become general in the areas of technical computations, data processing and the guidance of industrial and economic processes. A number of machine--and intellectual--centers have developed where they have created databases for this or that area, and remote processing is on the agenda or has been realized also. The advantages accompanying the technique of remote processing--modernization of work methods, work which accelerates with use of terminals, and more economical utilization of the human resources which are in short supply--justify the swift spread of this technique.

Radiating networks starting from the several computers have developed, making it possible for users of this or that center to access the computer from a distance, from their place of work.

Parallel with development the size and the price/performance relationship of the mechanical devices have changed to a very large degree also. It is well known that despite the general inflation the price of electronic devices--constituting an exception--shows a decreasing trend. Fundamentally new devices and possibilities have appeared, primarily through the use of microprocessors. This makes necessary a review of earlier thinking and the development of new conceptions in which the new mechanical and programming tools will have a suitable place.

Simultaneous with the development of tools there has been a development of organizational forms which require from the computer technology systems services which are absolutely reliable and which adjust to the daily work of the users.

The narrowing of investment resources and the increase in the quality demands connected with computer technology made necessary a better organization of work and a more rational use of capacity. A certain division of labor developed among the several computer centers and the exchange of magnetic tape data developed and then became systematic.

But we can satisfy the ever increasing, justified demands only if we develop further the existing systems and expand their services.

This applies to energetics also; in our day especially very significant economic policy and material interests attach to efficient and economical planning, operation and development of energetics. The creation of a computer network is already an indispensible condition for the solution of these tasks, raising the energetics computer applications to a higher level, satisfying the ever increasing demands being made of the energy industry and coordinating the limited resources. A concept for the energetics computer network, ENERGONET, has been prepared. The VEIKI [Electric Power Industry Research Institute] and the MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences] developed the system jointly. In what follows we will describe the ENERGONET network.

Basic Principles of the ENERGONET Conception

The ENERGONET is a distributed intelligence, cooperative system based on the cooperation of and a division of labor among the elements of the network. It has three levels of realization--the large computers, the node computers and the network, or terminals.

It is not useful or possible to have every node of the network repeat every function at the same level. For this reason the several areas participating in the ENERGONET--each of which have high level technical and intellectual resources--become providers of primary services within the framework of a division of labor. The other users of the network have organized access to these services (for example, one computer center maintains this or that text or numeric basic file while the others make use of this reliable site).

For example, each node can be the patron of the following functions:

--management and updating of various databases,

--carrying out systems development tasks (for example, special translating programs and languages, a high speed parallel processor),

--managing databases taken over from process control (for example, the OVT [National Enterprise for Power Lines]),

--maintaining contact with national systems (KSH [Central Statistics Office], PM [Ministry of Financial Affairs], OT [National Plan Office], OMIKK [National Technical Information Center and Library], etc.), and

--providing computer technology background capacity (for rarely occurring large tasks or in the event of operational failures).

In the ENERGONET network we are planning for node computers which have three interfaces--for connection to a large computer, to terminals and to the similar interface of other node computers.

All three levels of the network mentioned have appropriate intelligence, background storage and translating programs. Thus tasks will be performed at the lowest level at which they can be performed. In addition to greater reliability this burdens the network with less data and program traffic.

To make the ENERGONET work one must develop coordinated cooperation among the nodes of the network in the areas of:

--machine base, network and basic software,

--user programs and database management systems, and

--creation, updating and use of data and program stores.

We intend to realize the ENERGONET by making use of the existing computer technology tools of the power industry, on the basis of socialist devices, with an integration of domestic results achieved--primarily the SZTAKI developments. Development will require 4-5 years until it is put in regular operation.

The network will constitute the information base for the power industry, it will provide uniform organizational and data systems and collective utilization of the computer technology capacity created.

In what follows we will describe the plan for the ENERGONET system in more detail.

A More Detailed Explanation of the Concept

The ENERGONET is a distributed intelligence computerized service network with the task of a reliable, economical, high level satisfaction of the needs of users with the aid of computers working with various databases.

The system described in the concept consists of the three chief parts already mentioned:

--The highest level is the level of the large computers. These will have a background capacity of several hundred M bytes, a processor with a speed of 50,000 to 500,000 operations per second, and an appropriate assortment of peripherals. At this level we will perform the tasks requiring a large number of computations and will store here the large size numeric and text databases.

--The middle level is the level of minicomputers supplied with disks with a capacity of several tens of M bytes. These computers play primarily the role of node computers for the computer network, but in the event of a suitable configuration they can do local processing also.

--The lowest level is the level of intelligent terminals; these have serveral hundred K bytes of background storage, microprocessors, translating programs and line algorithms. One new item in the concept is that the terminals will be able to perform locally, with their own translating programs, all those tasks for which their capacity and background storage is adequate. Naturally they will also be able to work with the connected node computers (the middle level) using their resources or accessing the databases stored in the large computers through the node computers.

One essential unique aspect of the conception is that every level has a high level translating program and background storage. Thus tasks can always be performed at that level where this is simplest. The user of the terminal will be able to solve a small task without making use of the large computer, or he can perform with local operation of the terminal the data and program preparation and text editing needed to make use of the higher levels. The translating programs of the terminals will be such that the results given by them can be used as data in the course of large computer contact.

In what follows we will review briefly the parameters of the several machine levels of the conception and the machine solutions belonging to these. We will carry out the review "bottom-up."

The "Super Terminal"

As we noted in the foregoing, the parameters of the terminals figuring in the conception differ from those of customary terminals. The two essential differences are the background storage and the translating program. The background storage can be magnetic tape cassette or floppy disk. We selected disk for the development of the first systems corresponding to the conception.

The technical realization of the terminal is an important step. A device based on the VDT 52122 terminal (more recently the VPC) manufactured by Videoton is suitable for this purpose. This equipment has the two mini-floppy disk units and sufficient memory to make the translating programs useable. The VT 20 machines and other systems can be sued here also. These program modules are needed for the terminal--a line algorithm, a translating program and a text editing program, which handles programs

data stores. In addition it is important to have a suitable assortment of auxiliary programs for debugging, copying and other customary tasks.

It is a property of the system, which we call the super terminal, that with the aid of the built-in line algorithm one can make contact with other elements of the computer network at any time, by interrupting local operation, and this contact can be maintained even if, after the job being done in the course of the contact, the operator switches termporarily to local operation (for example, for the purpose of further processing of the data). Contact with the line, that is with the network, is indicated on the screen of the terminal. This solution makes it possible for the operator of the terminal to make free use of the local translating, preparation and editing activities and then, after logging on, accessing the databases which can be obtained from the network, or suspending this activity in order to study or further process the data obtained on the local terminal. This method is of great significance partly because of the operation of the large computer programs and partly because of use of the connected network.

As a basic configuration for the terminal we decided on a screen and keyboard, two floppy disk units, printer and line connection unit. This configuration makes possible the recording of results obtained in the local or communications mode in background storage or, if need be, on paper. The program and data library located with the local terminal can contain data and programs for local processing and the access algorithms for remote databases.

The Node Computer

The node computer plays a triple role. It manages and connects the terminals connected to it; it provides an interface to the large computer; and it makes possible contact with the same interface points of other node computers via a high speed channel.

This triple division of tasks also has the advantage that if there is no high speed connection the node computer can provide the function of a multiplexer; if there is no connection to the large computer then the node computer can be a terminal connection concentrator for the network; and if the terminals are not installed then the node computer can be connected to the large computer network.

A channel-channel adapter makes possible the link between node computer and large computer. In general this is an ESZR [Uniform Computer Technology System] connecting unit connected to the multiplex or byte multiplex channel of the large computer.

The terminal connection unit contains asynchronous and synchronous connections. In the case of asynchronous connection it realized the standard asynchronous connection and/or, for example, the AP 70 algorithm; in the case of synchronous connection it realizes, for example, the BSC algorithm. Speeds can be varied in accordance with the requirements of the terminal or line. The maximum planned speed is 2,400 baud.

The algorithm of the high speed line connection unit corresponds to the X.25 international standard. It is thus possible to use multiple paths between node computers. The planned speed is at least 9,600 baud.

We selected the ESZ 1010M and SZM-4/1140 computers, generally used in the power industry, to use as node computers. Both models are widely used. Their selection is also advantageous because in many cases the realization of the ENERGONET can begin, using them, without any additional investment or parts supply or operational problems.

In general the SZM-4/1140 computers are used for process control tasks and/or data processing. The RSX operating system makes it possible for them to offer these services in addition to their role as node computer, doing local processing in the event that their use in communications decreases or ends.

One reason for selecting the ESZ 1010M computers is that they are used already in large numbers as Videoplex data preparation devices, and with the organizational and software system being developed in accordance with the concept we will be able to connect them with the large computer network at the price of ending grouped data recording. In this way the use value of the already operating computer-terminal complex will increase significantly without any special investment.

Considering that both machines are very reliable in regard to central unit and memory but that the disks containing moving mechanical elements are less reliable than the electronic elements, we developed the software system so that they can carry out the functions of node computer even in the event of failure of the mechanical elements; at most, the local processing or statistical data collection functions will be limited during this time.

The data transmission paths will be provided physically by the Postal or branch of industry networks. To a large extent we want to make use of connected networks, primarily between the terminals and node computers.

The registering and control program module is a very important element of the network; this indicates the status, location and use of the several databases. This module serves to indicate the node or large computer which is responsible for the given database in regard to the service requested by the terminals. It also makes it possible to review the status of data and program files from the points responsible for the operation of the network.

The Large Computer

The large computers are the largest capacity resources of the ENERGONET system. Physically they are large capacity computers, ESZR compatible in practice, which have a central memory capacity in the 0.5-5 M byte range, the total capacity of their magnetic disk background storage extending from a few hundred M bytes to one G byte. They are connected to the ENERGONET system via the channel-channel adapters in the node computers.

The channel-channel adapters are connected to the multiplex or byte multiplex channel of the large computers. The remote processing access method in the operating systems of the large computers make possible the connection between the channel and the operating systems running in the large computers. It is a condition for the use of these that the node computer connected to the channel of the large computers be regarded from the large computer as a remote processing control unit supported by the software of the large computer. The solution of this is the joint task of the channel adapter and the program running in the node computers. In the event that this condition is met free use can be made of the very valuable methods supporting large computer remote access.

Using the remote processing connection systems the large computer operating systems handle the lines at the logical level, making it possible to satisfy requests initiated by the node computer with the aid of lines available to the large computer defined in the course of generation.

The Programming Technique System

The programming technique system of the computer network is divided into three levels--operating systems and data transmission access methods, translating programs and user software, and various data base management programs.

One condition for efficient operation of the network is a standardization of operating systems and programs aiding use which provides the user with a system permitting uniform operation of the network. It is a condition for this that the software elements used should be identical or compatible.

In the ENERGONET system the node computer connects the terminals of several users, after initial log-on and identification, to the appropriate line of the large computer called and thus the user can log-on to the remote processing program running there. Although it would be useful and desirable for these remote processing programs to be identical for every large computer connected to each node computer we could not realize this in the first phase of building the ENERGONET. The reasons for this are the different computer characteristics, the lack of virtual memory managment, the unique system of the HIDIC computer, and the capacity limitations of the ESZ 1022 computers. But it is still important that the number of remote access methods be minimal. It appears that the TSO, CICS and ETSS satisfy every need which might be made of the network large computers.

It is also necessary to limit the number of translating programs. In the present situation it is useful to use BASIC at the terminal level, BASIC, PASCAL and the C language at the middle level, and PL/1, FORTRAN and developed versions of assembly at the large computer level. The reason for this is the large number of developed programs written in these languages and the need presented by international program exchange. Naturally, we do not rule out a role being played by special translating programs either.

The basic idea of the ENERGONET conception is a division of labor among nodes. Within this framework there is a fundamental possibility that the personnel and working environment developed around this or that large computer should offer services the repetition of which is neither justified nor economical in another node, and which can be accessed from any terminal in the network. One form of such services is special translating and user programs. We should note that with the aid of the ENERGONET the practice of leasing computer programs, now increasing, will significantly expand individual, sometimes expensive use possibilities.

According to the principles of the ENERGONET conception the computers participating in the network will work in a uniform system at the level of databases. Taking the domestic possibilities into consideration we consider it useful to use the IDMS system with sufficient background storage for storing numeric data and the STAIRS system to store textual information.

The two systems recommended are internationally recognized, very reliable, high performance systems the possibilities of which will satisfy the needs of domestic users for a long time. Much conversion work will precede the handling of numeric information in the IDMS system. But this can be done parallel with the development of the ENERGONET and at the time of magnetic tape data exchanges. The use of a common database management language and structure description will greatly aid a uniform formal and substantive management of information and will have the advantage that a terminal user, signing on to any computer, will be able to access the information stored in the numeric databases in the same way.

Coordinating and supervising the work of creating the databases is a very important and large task. We must ensure the utilization of the basic records for the databases (enterprise rolls, national numbering systems, ministry level standardization, etc.) in such a way that some node of the network will be commissioned to handle each one, periodically making the updated data systems available to all participants in the network.

The STAIRS textual database management system also is connected with the text management systems used in international computer networks.

The Organizational System

Organizing the computer network will constitute a significant part of the work accompanying creation of the ENERGONET. The chief groups of these organization tasks are:

--fixing and designating for the long term the division of labor among the large computers,

--developing uniform database management systems, standardizing the basic records and basic structures,

--ensuring uniform translating program and software supply,

--fitting the node computers of the computer network into the systems used by the various nodes,

--ensuring the hardware and software base representing the condition for the realization of the computer network,

—planning the telecommunications possibilities at the Postal and MVMT [Hungarian Electric Works Trust] level, and

--solving the accounting problems for operation of the computer network.

Solving these tasks, which requires significant work, has begun and partial results have been achieved in some areas already. The division of labor to be realized among the nodes in accordance with the ENERGONET conception can be surveyed in the light of systems already developed.

Comprehensive economic and technical databases have been created in some computer centers (VEIKI); the trust centers (MVMT and OKGT [National Oil and Gas Industry Trust]) are maintaining trust databases; a number of users have gained experience in very effective work done with terminals (EROTERV/Designing Enterprise for Electric Power Plants]). The development of the network, bringing in new service areas and expanding the services of participating computer centers, is constantly enriching both the data files and the variety of methods. In addition to making the available equipment more reliable and better utilizable the ENERGONET could become the organizer of trust data systems and of inter-trust data systems.

8984
CSO: 2502/6

ELECTROSTIMULATION ENHANCES SEED VIGOR, RESISTANCE TO ADVERSE FACTORS

Budapest MAGYAR NEMZET in Hungarian 2 Nov 83 p 7

[Article by Istvan L. Horvath: "Who and What is 'Shocked' by the Invention?"; passages enclosed in slantlines are printed in italics]

[Text] He tied his invention, a homemade device to the back, more correctly, to the top of the Trabant and departed. He started across the country with stubborn determination. He visited agricultural cooperatives and state farms to demonstrate his truth: /that plants grown from sowing seeds treated with his machine are superior to others with their higher yield and better quality.../

Promises Spectacular Profit

The fog of incomprehension surrounding the "shock" treatment of sowing seeds lifts with great difficulty. However, what this patent offers is not negligible; profit to the national economy could only be measured in the billions if...if it would be widely used and introduced as soon as possible, declares the inventor, Lajos /Serf/, retired assistant lecturer at the College of Horticulture. Today, however, the picture is already clearer; more has happened with the invention during the past /1 1/2/ years than in the previous /20/. It is true that Lajos Serf is constantly on the road even today; he dares not stop. He inspects the new devices which have been built and placed in operation in the meantime, and of course, strives to recruit additional believers.

"Both of the existing devices were jointly constructed and financed by myself together with my colleagues Mrs. Emil /Nemedy/ and Mrs. Karoly /Turoczi/. We have spent more than 160 thousand forints of our own money," says a mildly bitter Lajos Serf.

But what is it that we are talking about, what does the oddly sounding term /"shocked" sowing seed/ mean?

The essence of the technique is to place the seeds in a high-voltage electrostatic field and after this process the plants germinating from these seeds show a surprisingly great deal of vigor. And this vitality remains throughout

the entire developmental period; /the plants sprout more uniformly, the yield increases, the quality is improved, and the resistance to drought is increased./ Why? Although what happens inside the seed is still not adequately determined, it is certain, however, that the electric current, the "shock", does cause biophysical changes; it influences the workings of the biocurrent, and stimulates the plant to reach its maximum potential during its lifetime--even amidst unfavorable climactic conditions!

The profit could be formulated in several different ways. It is almost unparalleled: /the profitability per "sown" kilowatt of energy could even exceed 200 thousand forints./ This could be attributed to the fact that the treated plant is better able to utilize the inexhaustible, constantly renewed energy transmitted by sunlight. According to observations, /the treatment results in a minimum of a 2000-forint surplus income per hectare; although, one must add that this is so only in cases where the plants are not developing under ideal conditions. And this is not a contradiction, i.e. the value of the treatment could best be measured when something needed for plant growth--water, nutrients, sunlight--is missing during the growing season.

But when is the weather optimal? /In contrast, the investment for farms wishing to use this procedure is between 100-150 forints per hectare/. It is possible and permissible to risk this much since even if the size of the crop will not improve, its quality is guaranteed to improve regardless of the capricious weather. In the case of sugar beets, the process could even increase the average sugar content by 1 percent, and this could mean an additional profit of several thousand forints per hectare. Nor is it a negligible profit that /the plants all ripen at the same time/ which makes mechanical harvesting easier. This refers primarily to string beans, cucumbers, tomatoes, spice paprika and green peas. For example, in the last, the pods are filled at the same time and /the quantity of peas which could be shelled may even be increased by 40 percent/.

It is so wonderful as to be almost unbelievable. However, all of this is demonstrated by the many small-plot and representative workshop experiments performed during the past 20 years. Already in 1969, a ten ton yield per hectare was obtained for corn at the /Research Institute of Martonvasar/ by using this method.

/And now, this year, how large of an area was sown with "shocked" plants?/

"We treated nearly 3000 tons of sowing seed on 24 farms. And this is not much", says the inventor. "Actually today we are still only at the experimental stage..."

After the Business Failure...

Lajos Serf's process was already registered, /and protected by patent/, in 1972. True, the former machine was somewhat different; it was larger, not portable, and had a more complicated structure. The English took notice of the process and wished to purchase it. However, the inventor was not willing to agree... The machine became a failure right before his eyes here at home. And

simultaneously, the process also "hit bottom"; the /seed stimulation patent/ was lost after a time because he was unable to pay the invention maintenance fee. No one was interested in the process, because, as he says, "at the time the prerequisites for large-scale production were not given; a decade ago, few cared much about quality or the cost of production."

However, he further refined and perfected the process, but in truth, he was only able to make his move 3 years ago when he retired. He started again, freely managing his time and knowledge. Last year, he again patented a modernized version of the former procedure. It was accepted, and he succeeded in protecting it. In the meantime, /he won second prize for his "shock" treatment in a competition for material conservation sponsored by the MTESZ/.

Following this success, first the /Agricultural Combine of Baja/ and then later /the Association of Creative Youth/ appeared to embrace and finance the process. ELMSZOLG, an organization under the aegis of a large-scale agricultural concern, undertook its popularization, the transportation of equipment and servicing; the Creative Youth undertook its management and the conclusion of contracts. Thus, the "three-legged" agreement came into being. Although today there exists an agreement precisely stipulating the rights and responsibilities of inventor and user, ELMSZOLG has to date still not paid for the two machines presently in operation. However, more importantly, there is now the hope that in the future ever more farms will utilize the "shock" treatment, thereby also proving the justification of the process with large-scale experimentation.

This year, in the summer, electrically treated silage corn was also planted at the /State Farm of Hajduszoboszlo/. Jozsef /Sandor/, branch manager, declares:

"The treated corn fields were visibly denser, fresher and more vital. And despite the lack of rainfall, they yielded about twice as much as the control..."

Utilization--In More and More Places

The experts state that 50 to 80 percent greater yield could be harvested than at the present from the country's ploughland by the year 2000. At first glance, this would perhaps seem utopistic since such a big jump from the present high level of production seems almost impossible. But this is not farfetched, since an optimal sowing structure--where every plant develops only in areas where conditions are best suited to it--alone could represent a 15 percent increase in yield.

But what does Imre /Koncz/, deputy department head of MEM, think of the electric treatment?

"The experiments are truly encouraging, but the pleasing results reached here /have yet to be verified in practice by large-scale farming/. Without this, its sudden large-scale introduction would be irresponsible. Unfortunately, it has already often been proven that what produces spectacular miracles during experimentation does not always work in the fields. This process is merely one

of many similarly promising methods. We /support/ and propagate this one along with the rest; naturally, however, the farms themselves must decide on its utilization..."

/Obviously, for the propagation of the method, so that stimulated seeds could be sown on increasingly larger areas, it would be necessary to have more equipment.../

"There will be enough ", says a reassured Lajos Serf. "We have already established the foundations for implementation; the 'soul' of the machine, the electronics, will be manufactured by ELMSZOLG under our supervision. We will have the other parts manufactured by small craftsmen. According to our calculation the cost of each machine is between 80 and 100 thousand forints. But this is actually a secondary consideration, since our goal is to lease the machine to farms..."

But the interest in the process is growing not only here at home but also abroad. Several countries, among them Austria and China, have expressed their interest in utilizing the Hungarian process. Only let us not be left behind at the first step--interest.

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BRIEFS

PERSONAL COMPUTER QUALITY--According to Dr Pal Lenard, first secretary of the Hungarian Academy of Sciences, Hungary is producing state of the art equipment in the field of personal computers. Hungarian-Soviet cooperation plays a major part in this. The computer developed by the Central Physics Research Institute is the result of close collaboration with institutions of the Soviet electronics industry ministry. The Hungarian institute receives valuable parts, including the CPU of the computer from the USSR thereby obviating the need for capitalist imports. The secretary considers the Proper-16 personal computer developed by the Computer Technology Coordinating Institute [SZKI, Szamitastechnikai Koordinalo Intezet] of major significance. This machine has already been demonstrated to and approved by the president of the Soviet Academy of Sciences, and there is great interest in it in both socialist and capitalist countries. Cooperation in the area of computer technology has improved greatly recently: institutes and institutions no longer consider their work as something to be closely guarded. Current cooperation between the Central Physics Research Institute and SZAMALK (Computer Technology Application Enterprise) is a good example of the new trend. [Text] [Budapest MAGYAR HIRLAP in Hungarian 10 Sep 83 p 2]

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